

# **2004 FIRE WEATHER OPERATING PLAN FOR NWSFO SIOUX FALLS NATIONAL WEATHER SERVICE, SIOUX FALLS, SD**

## **I. INTRODUCTION**

This document serves as the Sioux Falls National Weather Service (NWS) Forecast Office Annual Operating Plan (AOP) for the interagency fire management community within the NWS Sioux Falls area of responsibility. The relationship between the NWS and land management agencies is established in the following documents:

- Interagency Agreement for Meteorological Services (National Agreement)
- NWS Directive NWSI 10-4; Fire Weather Services
- Rocky Mountain and Eastern Area AOPs and Mobilization Guides

This AOP provides specific policy and procedural information used to provide forecast service to the fire management community in the Sioux Falls forecast and warning area of responsibility. As seen in figure 1 below, the NWS Sioux Falls area of responsibility lies within both the Rocky Mountain and Eastern Area Coordination Centers. This document consolidates into one plan the support services provided by NWS Sioux Falls. In support of the Rocky Mountain and Eastern Area Coordination Centers (RMCC, EACC), the respective RMCC and EACC meteorologists will act as a liaison between the interagency fire management community and the NWS.

The AOP is updated annually. Before release, items are reviewed and coordinated between the NWS and user agencies prior to the onset of the spring fire season. All parties should have a copy of this plan available for reference purposes. It is also posted on the NWS Sioux Falls fire weather website minus the phone directory at <http://www.crh.noaa.gov/fsd/fireaop.htm>.

## **II. SIGNIFICANT CHANGES FOR 2004**

This AOP for 2004 is a total rewrite from any fire weather document which was previously written in the past for the Sioux Falls forecast area. Changes are extensive from previous documents.

Regarding some of the more significant changes in forecast products from last year include:

- 1) The Fire Weather Planning Forecast (FWF) will now be issued twice per day from April 1<sup>st</sup> through May 31<sup>st</sup>, and again from August 15<sup>th</sup> through October 31<sup>st</sup>. A morning FWF will be issued from June 1<sup>st</sup> through August 14<sup>th</sup>.
- 2) 24 hour trends of temperature and humidity will not be included in the FWF.
- 3) The mixing height and transport wind speed in the FWF will be an average from 1200 to 1800 hours.
- 4) Fixed fire weather zones will be utilized in the FWF.
- 5) New local RAWS and NFDRS point forecast information.

### III. SERVICE AREA AND ORGANIZATIONAL DIRECTORY

NWS Sioux Falls serves the southeast quadrant and a small part of south central South Dakota, southwest Minnesota, northwest Iowa, and extreme northeast Nebraska. Figure 1 below shows a map of the Sioux Falls forecast area.

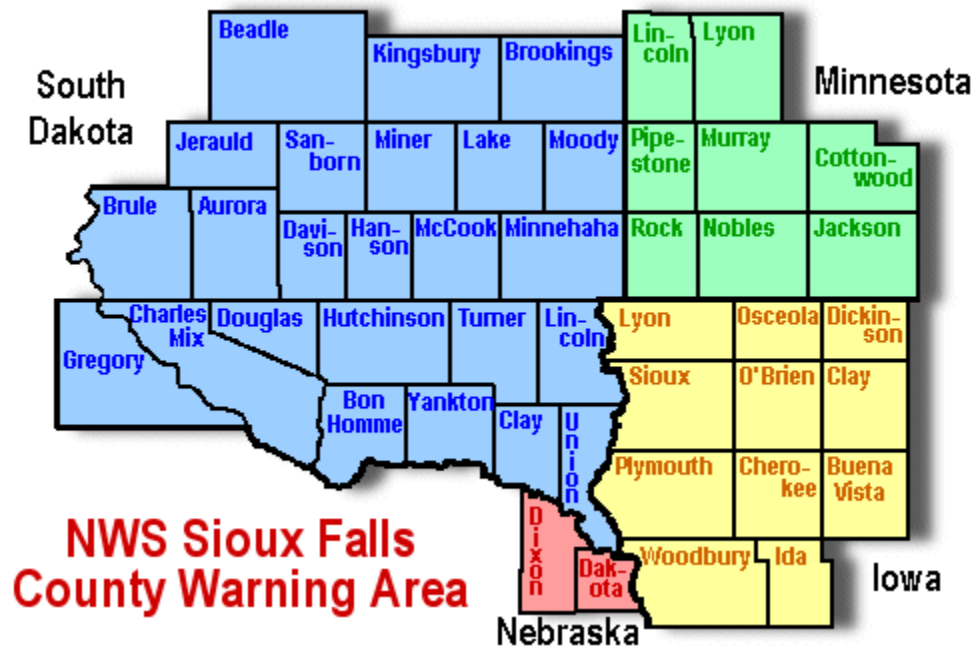


Figure 1. NWS Sioux Falls Forecast and Warning Area

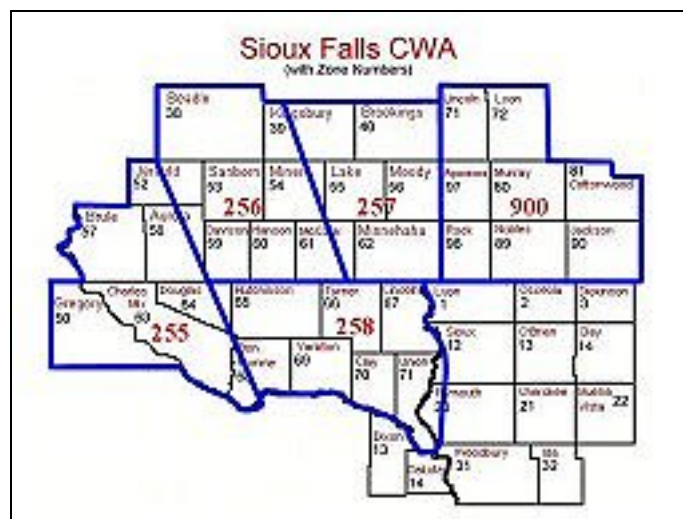
#### IV. SERVICES PROVIDED BY THE NATIONAL WEATHER SERVICE

**A. BASIC SERVICES** – This section describes the fire weather products and services provided by NWS Sioux Falls as described in National Weather Service Directive NWS 10-401. Since there are no full-time forecasters devoted solely to fire weather, fire weather duties are scheduled among other warning and forecast responsibilities. However, spot forecasts for wildfires are treated with very high priority.

##### 1. ROUTINE FIRE WEATHER FORECASTS

- a) **Issuance** – The Fire Weather Planning Forecast (FWF) will be issued twice per day, no later than 0700 and 1530 hours from April 1<sup>st</sup> through May 31<sup>st</sup>, and again from August 15<sup>th</sup> through October 31<sup>st</sup>. This product may be delayed if convective weather is threatening the area during the early morning or afternoon hours. The dates above coincide closely with the spring and fall prescribed burn seasons and when the most severe wildfire potential exists. A morning FWF will also be issued during the true summer months, from June 1<sup>st</sup> through August 14<sup>th</sup>. Except in excessively dry periods, these dates normally coincide the “green” period and higher relative humidity, reducing wildfire danger. In addition, prescribed burns are not normally conducted during this timeframe. Through interagency agreement, these dates can be altered to fit the current meteorological and fuel conditions.

The FWF is issued only for fire weather zones 255 through 258 and 900, which reside in the South Dakota and southwest Minnesota portions of the NWS Sioux Falls forecast area. Figure 2 shows a map of the Sioux Falls fire weather zones for the FWF. Except for a very small portion of northwest Iowa along the Big Sioux River, northwest Iowa and extreme northeast Nebraska in the Sioux Falls forecast area are excluded from the FWF due to lack of significant fire weather programs.



- c) **Format and Content of the Forecasts** – The morning narrative Fire Weather Planning Forecast is written for three forecast periods (TODAY, TONIGHT, TOMORROW). Afternoon narrative forecasts are written for four forecast periods (TONIGHT, TOMORROW, TOMORROW NIGHT, NEXT DAY). An extended forecast for days 3 through 7 is included at the end of each forecast group and a wind forecast is included through day 5. Examples of the morning and afternoon FWF narratives are shown in figures 3 and 4.

The elements in the FWF are:

- Headline
  - Required for Red Flag Warnings and Fire Weather Watches. May also include other significant weather concerns or changes (i.e., “wind advisory in effect for today”).
- Discussion
  - Non-technical description of general weather trends. Should be brief enough to make radio dissemination as efficient as possible.
  - Discusses reasoning for headlines or expected changes in critical parameters such as temperature, humidity and wind. Provides general weather information such as movement and timing of frontal positions, surface troughs, and high and low pressure systems.
- Sky/Weather
  - Sky and general weather conditions including trends.
  - As specific as possible on timing, duration and coverage of precipitation.
  - As specific as possible on cloud coverage.
- Chance of Precipitation
  - Will be included if 20 percent or greater in 10 percent increments.
- High and Low Temperature
  - Temperature changes will be small, generally 5 degrees or less.
- Relative Humidity
  - Forecast daytime minimum and nighttime maximum.
  - Humidity generally in 5 percent ranges.
- 20 ft. wind speed (mph) and direction
  - As specific as possible on timing of significant speed and directional changes.
  - Forecast direction to the nearest 8 cardinal compass points (northwest, north, southeast, etc.) and speed in 5 mph ranges. Gusts are included if applicable.
- Precipitation Amount
  - Included if chance of precipitation is 30 percent or greater.

*Other Included Elements*

- Haines Index
  - Determined for the 850-700mb level (about 5,000 to 10,000 ft).
  - Attached to the “TODAY” and “TOMORROW” periods in the morning FWF.
  - Attached to the “TOMORROW” and “NEXT DAY” periods in the afternoon forecast.

- Smoke Management Parameters
  - Depth of the mixing layer. The average mixing height from 1200 to 1800 hours.
  - Attached to the “TODAY” and “TOMORROW” periods in the morning FWF.
  - Attached to the “TOMORROW” and “NEXT DAY” periods in the afternoon forecast.
  - Transport winds (speed and direction) in the mixed layer and averaged from 1200 to 1800 hours.
  - Smoke Dispersal (mph-ft) is rounded to the nearest 1000 units. Units are not stated in the actual FWF. Roughly stated, after multiplying the top of the mixed layer (AGL in feet) and the transport wind speed (in mph) a number is produced with a text ranking of poor, fair, good or excellent.

<u>Dispersion Rate</u>	<u>Dispersion Index</u>
<13,000	Poor
13,000-29,999	Fair
30,000-60,000	Good
>60,000	Excellent

- Hours of Sunshine
  - Important for assessing the probability of ignition of fine fuels.
- Extended Forecasts
  - Providing a general forecast for days 3 through 7 and added after each forecast zone group.
  - Included are sky/weather, temperature, and a wind forecast through day 5. The most prevalent synoptic wind will be given for a 12 hour period.

FIRE WEATHER PLANNING FORECAST FOR SOUTHEAST SD/SOUTHWEST MN  
NATIONAL WEATHER SERVICE SIOUX FALLS SD  
630 AM CDT WED MAY 14 2003

...HEADLINE... (REQUIRED for Red Flag Warnings and Fire Weather Watches...significant features at other times recommended)

.DISCUSSION...SURFACE LOW PRESSURE OVER THE WESTERN PLAINS...AND HIGH PRESSURE EXTENDING ACROSS THE GREAT LAKES WILL COMBINE TO GIVE THE AREA BREEZY...HUMID AND WARM CONDITIONS THROUGH THE END OF THE WEEK. IN ADDITION...HIGH PRESSURE ALOFT WILL LIKELY KEEP THE RAIN AWAY TODAY THROUGH FRIDAY. IT IS FORECAST FOR THIS WEEKEND HOWEVER...THAT A STRONG COLD FRONT WILL MOVE INTO THE AREA GIVING INCREASING CHANCES OF RAIN. AFTER A SURFACE BASED TEMPERATURE INVERSION EARLY THIS MORNING...EXPECT SMOKE DISERSION TO IMPROVE FROM POOR TO GOOD BETWEEN 10 AM AND NOON.

SDZ255-152100-  
LOWER BRULE AND LAKE ANDES VICINITY  
630 AM CDT WED MAY 14 2003

...RED FLAG WARNING/FIRE WEATHER WATCH HEADLINE...(as needed in each appropriate zone grouping)

.TODAY...  
SKY/WEATHER.....MOSTLY SUNNY.  
MAX TEMPERATURE.....75-80.  
MIN HUMIDITY.....35-40 PERCENT.  
20-FOOT WINDS.....SOUTH WINDS 15-20 MPH.  
HAINES INDEX.....5 OR MODERATE.  
HOURS OF SUN.....11 HOURS.  
PRECIPITATION.....NONE.  
MIXING HEIGHT.....AROUND 1700 FT AGL (AVE 12-6 PM).  
TRANSPORT WINDS.....SOUTH AROUND 25 TO 30 MPH (AVE 12-6 PM).  
SMOKE DISPERSAL.....AROUND 46000 OR GOOD (AVE 12-6PM).

.TONIGHT...  
SKY/WEATHER.....PARTLY CLOUDY.  
MIN TEMPERATURE.....52-57.  
MAX HUMIDITY.....85-90 PERCENT.  
20-FOOT WINDS.....SOUTH WINDS 10-15 MPH.  
PRECIPITATION.....NONE.

.THURSDAY...  
SKY/WEATHER.....MOSTLY SUNNY.  
MAX TEMPERATURE.....AROUND 80.  
MIN HUMIDITY.....35-40 PERCENT.  
20-FOOT WINDS.....SOUTH WINDS 15-20 MPH.  
HAINES INDEX.....4 OR LOW.  
HOURS OF SUN.....12 HOURS.  
PRECIPITATION.....NONE.  
MIXING HEIGHT.....AROUND 2200 FT AGL (AVE 12-6 PM).  
TRANSPORT WINDS.....SOUTH AROUND 25 TO 30 MPH (AVE 12-6 PM).  
SMOKE DISPERSAL.....AROUND 59000 OR GOOD (AVE 12-6 PM).

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.FORECAST DAYS 3 THROUGH 7...(winds will be included days 3-5).
.FRIDAY...WINDY. PARTLY CLOUDY. LOWS 50 TO 55. HIGHS 80 TO 85. SOUTH WINDS 25 TO 30 MPH WITH
GUSTS TO AROUND 35 MPH IN THE AFTERNOON.
.SATURDAY...INCREASING CLOUDS. A CHANCE OF AFTERNOON THUNDERSTORMS. COOLER. LOWS AROUND 60.
HIGHS 70 TO 75. SOUTH WINDS 15 TO 20 MPH SHIFTING NORTHWEST IN THE AFTERNOON. CHANCE OF RAIN
50 PERCENT.
.SUNDAY...MOSTLY CLOUDY WITH SCATTERED SHOWERS. LOWS 43 TO 48. HIGHS 50 TO 55. NORTH WINDS 10
TO 15 MPH BECOMING NORTHEAST. CHANCE OF RAIN 50 PERCENT.
.MONDAY...SUNNY. LOWS AROUND 40. HIGHS 60 TO 65.
.TUESDAY...PARTLY CLOUDY. LOWS AROUND 45. HIGHS 64 TO 69.

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(The remainder of the zone groupings will follow under the following headers)...
SDZ256-152100-
MIDDLE JAMES RIVER VALLEY

$$

SDZ257-152100-
MIDDLE BIG SIOUX RIVER VALLEY

$$

SDZ258-152100-
LOWER JAMES RIVER TO LOWER BIG SIOUX RIVER VALLEY

$$

MNZ900-152100-
BUFFALO RIDGE SOUTHWEST MINNESOTA

$$
NAME (optional)

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Figure 3. Example of a morning fire weather planning narrative forecast

FIRE WEATHER PLANNING FORECAST FOR SOUTHEAST SD/SOUTHWEST MN  
NATIONAL WEATHER SERVICE SIOUX FALLS SD  
330 PM CDT WED MAY 14 2003

...HEADLINE... (REQUIRED for Red Flag Warnings and Fire Weather Watches...significant features at other times recommended)

.DISCUSSION...SURFACE LOW PRESSURE WILL STRENGTHEN AND REMAIN RATHER STATIONARY OVER THE WESTERN PLAINS THROUGH FRIDAY...WHILE HIGH PRESSURE MOVES SLOWLY THROUGH THE GREAT LAKES. THESE FEATURES WILL COMBINE TO GIVE THE AREA BREEZY...HUMID AND ABOVE NORMAL TEMPERATURES THROUGH THE END OF THE WEEK. HOWEVER THIS WEEKEND...THE WESTERN PLAINS LOW PRESSURE SYSTEM WILL TRACK EASTWARD AS A STRONG COLD FRONT...GIVING INCREASING CHANCES OF RAIN THROUGH THE AREA. THE LATEST DATA IS SHOWING CONDITIONS TO BE WET SATURDAY NIGHT AND SUNDAY WITH RAIN AND THUNDERSTORMS LIKELY.

SDZ255-151200-  
LOWER BRULE AND LAKE ANDES VICINITY  
330 PM CDT WED MAY 14 2003

...RED FLAG WARNING/FIRE WEATHER WATCH HEADLINE...(as needed in each appropriate zone grouping)

.TONIGHT...  
SKY/WEATHER.....MAINLY CLEAR.  
MIN TEMPERATURE.....52-57.  
MAX HUMIDITY.....85-90 PERCENT.  
20-FOOT WINDS.....SOUTH WINDS 10-15 MPH.  
PRECIPITATION.....NONE.

.THURSDAY...  
SKY/WEATHER.....MOSTLY SUNNY.  
MAX TEMPERATURE.....75-80.  
MIN HUMIDITY.....35-40 PERCENT.  
20-FOOT WINDS.....SOUTH WINDS 15-20 MPH.  
HAINES INDEX.....4 OR LOW.  
HOURS OF SUN.....11 HOURS.  
PRECIPITATION.....NONE.  
MIXING HEIGHT.....AROUND 2200 FT AGL (AVE 12-6 PM).  
TRANSPORT WINDS.....SOUTH AROUND 25 TO 30 MPH (AVE 12-6 PM).  
SMOKE DISPERSAL.....AROUND 59000 OR GOOD (AVE 12-6 PM).

.THURSDAY NIGHT...  
SKY/WEATHER.....PARTLY CLOUDY.  
MIN TEMPERATURE.....55-60.  
MAX HUMIDITY.....85-90 PERCENT.  
20-FOOT WINDS.....SOUTH WINDS 13-18 MPH.  
PRECIPITATION.....NONE.

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.FRIDAY...
SKY/WEATHER.....WINDY. PARTLY SUNNY. A CHANCE OF LATE AFTERNOON
                    THUNDERSTORMS. CHANCE OF RAIN 30 PERCENT.
MAX TEMPERATURE.....78-83.
MIN HUMIDITY.....35-40 PERCENT.
20-FOOT WINDS.....SOUTH WINDS 25-30 MPH WITH GUSTS TO AROUND 35 MPH IN THE
                    AFTERNOON.
HAINES INDEX.....5 OR MEDIUM.
HOURS OF SUN.....8 HOURS.
PRECIPITATION.....SCATTERED TRACE TO 0.05 INCH AMOUNTS.
MIXING HEIGHT.....AROUND 3200 FT AGL (AVE 12-6 PM).
TRANSPORT WINDS.....SOUTH AROUND 25 TO 30 MPH (AVE 12-6 PM).
SMOKE DISPERSAL.....AROUND 90000 OR EXCELLENT (AVE 12-6 PM).

.FORECAST DAYS 3 THROUGH 7...(winds will be included days 3-5).
.SATURDAY...INCREASING CLOUDS. A CHANCE OF AFTERNOON THUNDERSTORMS AND THUNDERSTORMS LIKELY
AT NIGHT. COOLER. LOWS 57 TO 62. HIGHS 70 TO 75. SOUTH WINDS 15 TO 20 MPH SHIFTING SOUTHWEST
LATE AFTERNOON. CHANCE OF RAIN 70 PERCENT.
.SUNDAY...MOSTLY CLOUDY WITH RAIN LIKELY. LOWS AROUND 45. HIGHS 50 TO 55. NORTH WINDS 10 TO
15 MPH BECOMING NORTHEAST. CHANCE OF RAIN 60 PERCENT.
.MONDAY...MOSTLY CLEAR. LOWS AROUND 40. HIGHS 60 TO 65. SOUTHEAST WINDS 5 TO 15 MPH.
.TUESDAY...PARTLY CLOUDY. LOWS 41 TO 46. HIGHS NEAR 65.
.WEDNESDAY...BREEZY. PARTLY CLOUDY. LOWS 49 TO 54. HIGHS 66 TO 71.

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(The remainder of the zone groupings will follow under the following headers)
SDZ256-151200-
MIDDLE JAMES RIVER VALLEY

$$

SDZ257-151200-
MIDDLE BIG SIOUX RIVER VALLEY

$$

SDZ258-151200
LOWER JAMES RIVER TO LOWER BIG SIOUX RIVER VALLEY

$$

MNZ900-151200-
BUFFALO RIDGE SOUTHWEST MINNESOTA

$$
NAME (OPTIONAL)

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Figure 4. Example of an afternoon fire weather planning narrative forecast

## 2. SPOT FORECASTS

**a) Criteria** – Spot forecasts are site specific forecasts for localized areas which currently have a wildfire in progress or for which a prescribed burn is planned. Spot forecasts for a wildfire are treated with a priority similar to that of severe weather warnings. The NWS Fire Weather Services Directive (10-401) states that “WFOs will provide spot forecast service upon request of any federal, state, tribal or local official who represents the spot forecast is required to support a wildfire.” For a spot burn request involving prescribed fires (non-wildfire), the NWS will provide spot forecast service under the following circumstances and conditions according to NWS Fire Weather Services Directive (10-401):

- Upon request of any federal official who represents that the spot forecast is required under the terms of the Interagency Agreement for Meteorological Services (NWS Instruction 10-406).
- Upon request of any state, tribal, or local official who represents that the spot forecast is required to carry out their wildland fire management responsibilities in coordination with any federal land management agency participating in the Interagency Agreement for Meteorological Services (NWS Instruction 10-406).
- Upon request of any public safety official who represents that the spot forecast is essential to public safety. A “public safety official” is an employee or contract agent of a government agency at any level (federal, state, local, tribal, etc.) charged with protecting the public from hazards including wildland fires of whatever origin and/or other hazards influenced by weather conditions such as hazardous material releases.

The last statement includes HAZMAT incidents upon government customer request and any prescribed burn fire from any government agency if the prescribed burn is a threat to public safety.

What WFOs can specifically not provide are spot forecasts to private citizens or commercial entities not acting as an agent of a government agency.

**A current on-site observation is recommended, but not required to receive a spot burn forecast.** An on-site observation may enhance the accuracy of the spot burn forecast. It is understood that if an on-site observation is received, the winds will be eye-level unless otherwise stated. Feedback from land management personnel is also encouraged during or after the burn.

**Spot forecasts are considered one-time requests and are not routinely updated.** It is primarily up to the officials conducting the burn to contact NWS Sioux Falls when the spot burn forecast is not representative. This is because the users know what exact meteorological conditions are occurring at their site and because the contact number will have likely changed. Through the monitoring of ASOS/AWOS and RAWS observation sites, NWS Sioux Falls may update the spot forecast if it is deemed unrepresentative but with the user already likely in the field, getting an update to the user will have to go through an intermediate channel (e.g., through their home office and relayed to the user via phone to the field).

**b) Content and Format** – Spot burn forecasts are a critical product, that need to be accurate and detailed, but yet concise, easy to understand and readily accessible for the users. The standard format for wildfire and prescribed burn spots from NWS Sioux Falls are: headlines (required for Fire Weather Watches and Red Flag Warnings, optional for other significant weather events); discussion; sky/weather; temperature (degrees F); dew point (degrees F); relative humidity (in %); 20 foot wind (mph); mixing height (ft., agl); transport wind (mph); smoke dispersion index and Haines index. Usually, the smoke dispersion parameters will not be given for the night time period. Also, depending on the confidence of the forecast, mixing height, transport wind, smoke dispersion index and Haines Index may NOT be included for the “tomorrow” period. An example of a typical spot burn forecast for a prescribed burn is given in figure 5.

c) **Procedures and Access** – Users are asked to read the narrative **Fire Weather Planning Forecast** before making a spot forecast request, to see if a burn can even be completed. The internet based “NWS Spot” program is the national standard for issuing spot burn forecasts. This being said, phone or fax requests are honored as always. NWS Spot can be accessed from the Sioux Falls fire weather web page through this URL: <http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=fsd>. In addition, if the user needs instructions on how to complete a request for a spot burn forecast using NWS Spot, a tutorial is available at <http://www.crh.noaa.gov/fsd/firehelp.htm>.

For the user to complete the NWS Spot form, the required elements (in red) must be filled out. The required elements are: project name, requesting agency, phone number, lat/lon, elevation and aspect. Filling out any additional elements on the form is highly encouraged and may result in a better forecast. When the form is completed, press the “submit request” button at the bottom of the page and the spot burn forecast request will immediately be alarmed on the AWIPS workstations at NWS Sioux Falls.

**On average, the turnaround time for NWS Sioux Falls to complete a spot burn forecast is about 30 to 45 minutes.** This of course is dependent on workload issues at the time of the request, in that there could be several spot burn requests already in the “pipeline” and/or there could be convective weather going on at the time of the spot burn requests. However remember that a wildfire spot burn request would receive top priority, right along with severe weather warnings. If the user has not received a spot burn forecast back within about 50 minutes to an hour, something might be wrong in that NWS Sioux Falls may not have received the request for some reason (i.e., computers down, internet network down). Please call NWS Sioux Falls at 605-330-4247 and get an update on what is happening.

SPOT FORECAST FOR SKUNK LAKE N BURN.....U.S. FISH & WILDFIRE SERVICE NATIONAL WEATHER SERVICE SIOUX FALLS 818 AM CST THU NOV 20 2003  IF CONDITIONS BECOME UNREPRESENTATIVE, CONTACT THE NATIONAL WEATHER SERVICE  ...GRASSLAND FIRE DANGER INDEX IN THE VERY HIGH CATEGORY THIS AFTERNOON...  DISCUSSION...PLEASE WATCH FOR A WIND SHIFT THIS MORNING. A COLD FRONT WILL SWEEP ACROSS THIS AREA NEAR 10 AM. WINDS ARE FROM THE SOUTHWEST AT 8 AM...BUT WILL RAPIDLY SHIFT TO THE NORTHWEST AT 15 TO 25 MPH AT 10 AM. BY NOON...GUSTS WILL BE AS HIGH AS 35 MPH.  FOR PLANNED IGNITION TIME OF 1100 CST 11/20/03				
FORECAST FOR THURSDAY TIME (CST)                      9 AM                      NOON                      3 PM                      6 PM				
SKY/WX.....	MOCLDY	PTCLDY	MOCLDY	MOCLDY
TEMP (F).....	56	61	55	53
DEW PT (F).....	29	29	26	24
RH (%).....	35	30	32	32
20 FT WIND (MPH).....	W-20	NW-22	NW-20	NW-16
MIXING HGT (FT, AGL)..	250	2000	4500	4500
TRANSPORT WIND (MPH)..	25	25	26	26
DISPERSION INDEX.....	POOR	GOOD	EXCEL	EXCEL
HAINES INDEX.....	4 (LOW)	5 (MODERATE)	6 (HIGH)	5 (MODERATE)
OUTLOOK FOR THURSDAY NIGHT TIME (CST)                      9 PM                      MIDNIGHT                      3 AM                      6 AM				
SKY/WX.....	MOCLDY	MOCLR	CLR	CLR
TEMP (F).....	34	27	23	21
DEW PT (F).....	16	14	12	11
RH (%).....	48	57	62	66
20 FT WIND (MPH).....	NW-12	NW-6	W-5	W-3
HAINES INDEX.....	4 (LOW)	4 (LOW)	3 (VERY LOW)	3 (VERY LOW)
OUTLOOK FOR FRIDAY TIME (CST)                      9 AM                      NOON                      3 PM                      6 PM				
SKY/WX.....	CLR	PTCLDY	PTCLDY	MOCLDY
TEMP (F).....	25	34	39	39
DEW PT (F).....	13	17	19	19
RH (%).....	61	50	45	45
20 FT WIND (MPH).....	W-5	SW-8	S-15	S-12
MIXING HGT (FT, AGL)..	250	2000	4500	4500
TRANSPORT WIND (MPH)..	6	8	17	17
DISPERSION INDEX.....	POOR	FAIR	EXCEL	EXCEL
HAINES INDEX.....	3 (VERY LOW)	3 (VERY LOW)	4 (LOW)	4 (LOW)
\$\$ NAME (OPTIONAL)				

Figure 5. Example of a Spot Burn Forecast from NWS Sioux Falls

### 3. FIRE WEATHER WATCH

a) **Criteria** – NWS Sioux Falls will issue a Fire Weather Watch when there is high potential for development of a Red Flag Warning event. A Fire Weather Watch will be issued for an area when **ALL THREE** of the following criteria are expected, in conjunction with dry, one-hour fuels:

- Sustained one-minute wind speeds at the standard 20 foot level are at or above 25 mph.
- Relative humidity at or less than 25 percent.
- Temperatures at or greater than 75 degrees F.

Dry lightning is considered, but rare in the Sioux Falls forecast area.

The Fire Weather Watch can be issued 12 to 72 hours in advance of the expected onset of red flag criteria. In the Sioux Falls area, the watch will most likely be issued 24 to 36 hours in advance of a Red Flag Warning. A Fire Weather Watch can only be issued within 12 hours of expected red flag criteria for a dry lightning event. However dry thunderstorms are rare in the Sioux Falls forecast area. If Red Flag Warning conditions are borderline, a Fire Weather Watch will not be issued. The Fire Weather Watch will be updated throughout the day if the statement is deemed unrepresentative. If new data is received and meteorological conditions are shown that a red flag event will not occur after all, the watch will then be cancelled. Before cancellation, MIFC dispatch and/or SD Wildland Fire Dispatch and Rocky Mountain Dispatch may be notified.

This product is fairly rare for the Sioux Falls forecast area, but when issued is most common during spring before greenup, and in the autumn after the first killing frost.

If the Fire Weather Watch is not in the current Fire Weather Planning Forecast, then the FWF will be updated. Fire Weather Watches are also headlined in any spot forecasts and in the FWF.

b) **Content and Format** – The Fire Weather Watch is a segmented product, issued by county for all, or selected portions of the Sioux Falls forecast area at anytime of the year. However one segment will likely be more common. The reason why this product is issued by county and not by fire weather zone is because northwest Iowa and far northeast Nebraska can be included in a Fire Weather Watch. Currently, a fire weather planning forecast is not issued for northwest Iowa and extreme northeast Nebraska, thus “fixed” fire weather zones have not been assigned to these areas. In addition, it is believed that a Fire Weather Watch should have more refined aerial detail which is given through county issuance, as opposed to the broader scale of the fire weather zones.

The elements in the Fire Weather Watch with an example shown in figure 6 are:

- Headline
  - A “headlined” product as “Fire Weather Watch.” The area(s) of concern and event expiration time is noted in the headline.
- Discussion
  - A non-technical description of general weather trends will be given along with a call-to-action statement(s). Discussion should be brief enough to make radio or phone dissemination as efficient as possible.
  - Provides general weather information such as movement and timing of frontal positions, surface troughs, and high and low pressure systems.

- Segment(s)
  - In the initial issuance of the watch, the following phrase will be included in each segment(s), “The National Weather Service has issued a Fire Weather Watch for...” This attribution line is optional for subsequent issuances.
  - Is segmented by county. Segment(s) will give a brief description of the meteorological events which caused the watch issuance highlighting expected temperatures, relative humidity and winds.

**c) Procedures and Access** – Fire Weather Watches are transmitted through the NWS AWIPS computer system. They are then available to customers via WIMS and through various NWS websites. The URL on the NWS Sioux Falls website for viewing the Fire Weather Watch is <http://www.crh.noaa.gov/fsd/products/rfwfsd.shtml>. Both a graphical map displaying the Fire Weather Watch and a text product are displayed at this URL.

Upon issuance of a Fire Weather Watch, NWS Sioux Falls will officially notify MIFC dispatch at 218-327-4558 if Minnesota counties are involved. If South Dakota counties are involved, South Dakota Wildland Fire Dispatch at 605-393-8017 will be notified as well as Rocky Mountain dispatch at 303-445-4300. If the two far northeast Nebraska counties are involved then only Rocky Mountain dispatch at 303-445-4300 will be notified. Notifications will occur as soon as possible. NWS Sioux Falls will make an effort to coordinate Fire Weather Watches with user agencies prior to issuance. The Fire Weather Watch will remain in effect until its expiration time unless the product is cancelled or upgraded to a Red Flag Warning.

FIRE WEATHER WATCH  
NATIONAL WEATHER SERVICE SIOUX FALLS SD  
237 PM CDT SAT APR 12 2003

DISCUSSION: THE NATIONAL WEATHER SERVICE HAS ISSUED A FIRE WEATHER WATCH FOR THE SOUTHEAST QUARTER OF SOUTH DAKOTA AND SOUTHWEST MINNESOTA. WITH LOW PRESSURE OVER THE WESTERN PLAINS...VERY WARM TEMPERATURES...STRONG SOUTH WINDS AND LOW RELATIVE HUMIDITY VALUES ARE EXPECTED ACROSS ALL OF SOUTHEAST SOUTH DAKOTA AND SOUTHWEST MINNESOTA SUNDAY AFTERNOON AND EARLY SUNDAY EVENING. THESE WEATHER CONDITIONS WILL COMBINE WITH DRY EARLY SPRING VEGETATION TO PRODUCE EXTREME GRASSLAND FIRE DANGER CONDITIONS ACROSS THE AREA. THIS FIRE WEATHER WATCH WILL BE UPGRADED TO A RED FLAG WARNING IF ALL OF THE FOLLOWING WEATHER ELEMENTS BECOME LIKELY OR ARE OBSERVED SUNDAY:

SUSTAINED ONE-MINUTE WINDS OF 25 MPH OR GREATER  
RELATIVE HUMIDITY AT 25 PERCENT OR LESS  
TEMPERATURES EQUAL OR EXCEEDING 75 DEGREES F.

THE NEXT SCHEDULED FIRE WEATHER FORECAST WILL BE ISSUED AROUND 530 AM SUNDAY...WITH EVENT DRIVEN UPDATES PROVIDED AS CONDITIONS WARRANT. PLEASE ADVISE THE APPROPRIATE OFFICIALS AND FIRE CREWS IN THE FIELD OF THIS FIRE WEATHER WATCH.

SDZ038>040-050-052>071-MNZ071-072-080-081-089-090-097-098-131130-  
AURORA-BEADLE-BON HOMME-BROOKINGS-BRULE-CHARLES MIX-CLAY-DAVISON-DOUGLAS-GREGORY-HANSON-  
HUTCHINSON-JERAULD-KINGSBURY-LAKE-LINCOLN-MCCOOK-MINER-MINNEHAHA-MOODY-SANBORN-TURNER-UNION-  
YANKTON-COTTONWOOD MN-JACKSON MN-LINCOLN MN-LYON MN-MURRAY MN-NOBLES MN-PIPESTONE MN-ROCK MN-  
INCLUDING THE CITIES OF...HURON...BROOKINGS...CHAMBERLAIN...VERMILLION...MITCHELL...SIOUX  
FALLS...ELK POINT...YANKTON...SLAYTON MN...WORTHINGTON MN...PIPESTONE MN...MARSHALL MN...  
LIVERNE MN...  
237 PM CDT SAT APR 12 2003

...FIRE WEATHER WATCH FOR SUNDAY AFTERNOON AND EARLY SUNDAY EVENING FOR THE SOUTHEAST QUARTER OF SOUTH DAKOTA AND SOUTHWEST MINNESOTA...

ON SUNDAY...WIND SPEEDS WILL LIKELY RANGE FROM 20 TO 30 MPH WITH HIGHER GUSTS...AND TEMPERATURES WILL CLIMB WELL INTO THE 70S AND LOWER 80S. RISING DEW POINTS ARE EXPECTED TO MOVE NORTH INTO THE WATCH AREA ON SUNDAY...SO SOME QUESTION REMAINS ON THE RANGE OF RELATIVE HUMIDITY BY SUNDAY AFTERNOON.

\$\$  
NAME (OPTIONAL)

Figure 6. Example of a Fire Weather Watch

#### 4. RED FLAG WARNING

**a) Criteria** – NWS Sioux Falls will issue a Red Flag Warning (RFW) when **ALL THREE** of the following criteria are occurring or imminent, in conjunction with dry, one-hour fuels:

- Sustained one-minute wind speeds at the standard 20 foot level are at or above 25 mph.
- Relative humidity at or less than 25 percent.
- Temperatures at or greater than 75 degrees F.

A Red Flag Warning can also be issued with the occurrence of dry thunderstorms with lightning, but dry lightning is very rare in the Sioux Falls forecast area. The RFW can be issued up to 24 hours in advance of the expected onset of red flag criteria. It is also possible that a Fire Weather Watch may not precede a RFW in events that are “unforeseen.” The RFW will be updated throughout the day if the statement is deemed unrepresentative.

The RFW can also be cancelled if the meteorological conditions become unfavorable for the red flag criteria to continue. Before cancellation, there will be an attempt to notify MIFC dispatch and/or SD Wildland Fire Dispatch and Rocky Mountain Dispatch.

This product is fairly rare for the Sioux Falls forecast area, but when issued is the most common during the spring before greenup, and in the autumn after the first killing frost.

If the Red Flag Warning is not in the current Fire Weather Planning Forecast, then the FWF will be updated. Red Flag Warnings are also headlined in any spot forecasts and in the FWF.

**b) Content and Format** – The RFW is a segmented product, issued by county for all, or selected portions of the Sioux Falls forecast area at anytime of the year. However one segment will likely be more common. The reason why this product is issued by county and not by fire weather zone is because northwest Iowa and far northeast Nebraska can be included in a RFW. Currently, a fire weather planning forecast is not issued for northwest Iowa and extreme northeast Nebraska, thus “fixed” fire weather zones have not been assigned to these areas. In addition, it is believed that a Red Flag Warning should have more refined aerial detail which is given through county issuance, as opposed to the broader scale of the fire weather zones.

The elements in the Red Flag Warning with an example shown in figure 7 are:

- Headline
  - A “headlined” product as “Red Flag Warning.” The area(s) of concern and event expiration time is noted in the headline.
- Discussion
  - A non-technical description of general weather trends will be given along with a call-to-action statement(s). Discussion should be brief enough to make radio or phone dissemination as efficient as possible.
  - Provides general weather information such as movement and timing of frontal positions, surface troughs, and high and low pressure systems.
- Segment(s)
  - In the initial issuance of the warning, the following phrase will be included in each segment(s), “The National Weather Service has issued a Red Flag Warning for...” This attribution line is optional for subsequent issuances.
  - Is segmented by county. Segment(s) will give a brief description of the meteorological events which caused the warning highlighting expected temperatures, relative humidity and winds.

**c) Procedures and Access** – RFWs are transmitted through the NWS AWIPS computer system. They are then available to customers via WIMS and through various NWS websites. The URL on the NWS Sioux Falls website for viewing the Red Flag Warning is <http://www.crh.noaa.gov/fsd/products/rfwfsd.shtml>. Both a graphical map displaying the Red Flag Warning and a text product are displayed at this URL.

Upon issuance of a Red Flag Warning, NWS Sioux Falls will officially notify MIFC dispatch at 218-327-4558 if Minnesota counties are involved. If South Dakota counties are involved, South Dakota Wildland Fire Dispatch at 605-393-8017 will be notified as well as the Rocky Mountain dispatch at 303-445-4300. If the two far northeast Nebraska counties are involved then only Rocky Mountain dispatch at 303-445-4300 will be notified. Notifications will occur as soon as possible. NWS Sioux Falls will make an effort to coordinate Red Flag Warnings with user agencies prior to issuance. The Red Flag Warning will remain in effect until its expiration time unless the product is cancelled.



**d) Verification** – The NWS Fire Weather Services Directive (10-4) mandates that Fire Weather Watches and Red Flag Warnings will be verified. In the NWS Sioux Falls forecast area, Fire Weather Watches and Red Flag Warnings will be verified by county. Data will be kept by the Sioux Falls fire weather program leader and the verification statistics compiled at the end of the calendar year. The final verification statistics are then forwarded to the NWS Central Region Headquarters (CRH) in Kansas City, MO and also included in the annual NWS Sioux Falls fire weather report.

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RED FLAG WARNING
NATIONAL WEATHER SERVICE SIOUX FALLS SD
459 AM CDT SUN APR 13 2003

DISCUSSION:  THE AREA WILL BE SITUATED BETWEEN HIGH PRESSURE OVER THE GREAT LAKES...AND LOW
PRESSURE IN WESTERN NORTH DAKOTA TODAY.  THESE FEATURES WILL COMBINE TO GIVE VERY WARM
TEMPERATURES AND STRONG WINDS THIS AFTERNOON AND EARLY EVENING.  WITH THE LACK OF RAIN OR
SNOWFALL THIS MONTH...FUELS ARE EXCESSIVELY DRY AT THIS TIME ADDING TO THE FIRE DANGER.  A
RED FLAG WARNING IS ISSUED WHEN ALL OF THREE OF THE FOLLOWING CONDITIONS ARE MET OR IMMIMENT:

SUSTAINED ONE-MINUTE WINDS OF 25 MPH OR GREATER
RELATIVE HUMDITY AT 25 PERCENT OR LESS
TEMPERATURES EQUAL OR EXCEEDING 75 DEGREES F.

THE LOW PRESSURE AREA WILL MOVE EAST INTO NORTHERN MINNESOTA ON MONDAY...WITH A TROUGH
EXTENDING SOUTHWEST INTO SOUTH DAKOTA.  ALTHOUGH TEMPERATURES WILL STILL BE QUITE WARM FOR
THIS TIME OF YEAR...THE TROUGH WILL ALLOW FOR LIGHTER WINDS ACROSS THE REGION MONDAY
AFTERNOON.  RELATIVE HUMIDITY VALUES WILL ALSO INCREASE ON MONDAY AS SOME LOW LEVEL MOISTURE
RETURNS TO THE AREA.

HANDLE ALL FIRE WITH CAUTION...A LITTLE FLAME CAN GO A LONG WAY TODAY.  PLEASE ADVISE THE
APPROPRIATE OFFICIALS AND FIRE CREWS IN THE FIELD OF THIS RED FLAG WARNING.

SDZ038>040-053>056-059>062-065>071-MNZ071-072-080-081-089-090-097-098-IAZ001>003-012>014-
020>022-031-032-NEZ013-014-140100-
BEADLE-BON HOMME-BROOKINGS-CLAY-DAVISON-HANSON-HUTCHINSON-KINGSBURY-LAKE-LINCOLN-MCCOOK-
MINER-MINNEHAHA-MOODY-SANBORN-TURNER-UNION-YANKTON-COTTONWOOD MN-JACKSON MN-LINCOLN MN-
LYON MN-MURRAY MN-NOBLES MN-PIPESTONE MN-ROCK MN-BUENA VISTA IA-CHEROKEE IA-CLAY IA-
DICKINSON IA-IDA IA- LYON IA-OBRIEN IA-OSCEOLA IA-PLYMOUTH IA-SIOUX IA-WOODBURY IA-
DAKOTA NE-DIXON NE-
INCLUDING THE CITIES OF...HURON...BROOKINGS...CHAMBERLAIN...VERMILLION...MITCHELL...SIOUX
FALLS...ELK POINT...YANKTON...SLAYTON MN...WORTHINGTON MN...PIPESTONE MN...MARSHALL MN...
LUVERNE MN...STORM LAKE IA...SPENCER IA...SPIRIT LAKE IA...ROCK RAPIDS IA...LE MARS IA...
SIOUX CENTER IA...SIOUX CITY IA...
459 AM CDT SUN APR 13 2003

...RED FLAG WARNING HAS BEEN ISSUED FOR THE SOUTHEAST QUARTER OF SOUTH DAKOTA...SOUTHWEST
MINNESOTA...NORTHWEST IOWA AND FAR NORTHEAST NEBRASKA...THIS AFTERNOON THROUGH 8 PM CDT THIS
EVENING...

THE NATIONAL WEATHER SERVICE HAS ISSUED A RED FLAG WARNING UNTIL 8 PM CDT THIS EVENING.

SOUTH WINDS WILL BECOME STRONG AND GUSTY THIS AFTERNOON AVERAGING 25 TO 35 MPH...WHILE PLENTY
OF APRIL SUNSHINE PUSHES AFTERNOON AND EARLY EVENING TEMPERATURES TO UNSEASONABLY WARM
READINGS IN THE LOWER TO MID 80S.  DEW POINT TEMPERATURES WILL FALL INTO THE MID AND UPPER
30S...LOWERING RELATIVE HUMIDITY VALUES TO ONLY AROUND 20 PERCENT.

$$
NAME (OPTIONAL)
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Figure 7. Example of a Red Flag Warning

## 5. GRASSLAND FIRE DANGER STATEMENT

**a) Criteria** – The Grassland Fire Danger statement (RFD) will be issued daily from April 1<sup>st</sup> through October 31<sup>st</sup>, between 5 and 6 am. This product may be delayed if convective weather is threatening the area during the early morning hours. Through interagency agreement, the dates above can be altered to fit the current meteorological and fuel conditions. In addition, a statement will also be issued from November 1<sup>st</sup> through March 31<sup>st</sup> if the grassland fire danger index rates “very high”, “extreme” or “red flag.” In clear-cut situations, the RFD can be issued for the next day if meteorological and fuel conditions are likely to produce a “very high”, “extreme” or “red flag” rating. The RFD statement will be updated throughout the day if the forecast is deemed unrepresentative. The statement can also be cancelled if conditions necessitate the termination of the product. If needed, the cancellation will be coordinated with the users and the users notified (MIFC dispatch and/or SD Wildland Fire Dispatch).

Besides current and expected meteorological conditions, the primary basis for input into the grassland fire danger calculation is “greenness” data based on the Normalized Difference Vegetative Index (NDVI) from the EROS Data Center (EDC) near Sioux Falls, SD. These satellite-based calculations are output once a week as “percent-green” data by the EDC and issued as an ASCII text file by NWS Sioux Falls for South Dakota. The percent green data relates how green the one-hour fuels are. One-hour fuels can sometimes dry, or moisten up faster than the weekly percent green data will show. In these cases, it is highly encouraged that the NWS forecasters call their users to get a feel for how moist or dry the fuels are. At that point, the forecaster can adjust the percent green data to fit the current one-hour fuel trends.

**b) Content and Format** – The RFD is a segmented product issued by county for all, or selected portions of the Sioux Falls forecast area. The segmentation of this product by severity of index and area is quite common. For example, one part of the Sioux Falls forecast area may have a grassland fire danger rating of “high”, another section may rate “very high”, etc. An example is shown in figure 8. The reason why this product is issued by county and not by fire weather zone is because northwest Iowa and far northeast Nebraska can be included in the RFD statement. Currently, a fire weather planning forecast is not issued for northwest Iowa and extreme northeast Nebraska, thus “fixed” fire weather zones have not been assigned to these areas. In addition, it is believed that a Grassland Fire Danger statement should have more refined aerial detail which is given through county issuance, as opposed to the broader scale of the fire weather zones. From April 1<sup>st</sup> through October 31<sup>st</sup> (when the daily morning issuance occurs), when the index rates “low”, “moderate” or “high”, a simple statement is written giving the index rating, but with meteorological conditions OMITTED from the segment(s). The discussion is also omitted. Conversely, if the RFD rates “very high”, “extreme” or “red flag” at any time of the year, then the meteorological conditions which caused these ratings are given in each segment(s) along with a discussion and call-to-action statement(s). Barring a red flag warning, the RFD is never “headlined”.

The elements in the RFD are:

- Headline
  - A “non-headlined” product. Although if a red flag warning is included in one or more of the segments, then the red flag warning itself is headlined.
- Discussion
  - Will only be included if the index rates “very high”, “extreme” or “red flag.”
  - If the index rates in one of these three categories, then a non-technical description of general weather trends will be given along with a call-to-action statement(s). Discussion should be brief enough to make radio or phone dissemination as efficient as possible.
  - Provides general weather information such as movement and timing of frontal positions, surface troughs, and high and low pressure systems.

- Segment(s)
  - If the grassland fire danger index rates “very high”, “extreme” or “red flag”, then the segment(s) will give a brief description of the meteorological events which caused these ratings, highlighting expected temperatures, relative humidity and winds.
  - During the daily morning issuance from April 1<sup>st</sup> through October 31<sup>st</sup>, the RFD may often give a “low”, “moderate” or “high” rating. In these cases, just a simple statement giving the rating is produced with no meteorological reasoning.

c) **Procedures and Access** – RFDs are transmitted through the NWS AWIPS computer system. They are then available to customers via WIMS and through various NWS websites. The URL on the NWS Sioux Falls website for viewing the RFD is <http://www.crh.noaa.gov/fsd/products/rfd/sd.shtml>. Both a graphical map displaying the fire danger indices and a text product are displayed at this URL.

If the RFD index rates a very high, extreme or red flag, NWS Sioux Falls will officially notify MIFC dispatch at 218-327-4558 (if Minnesota counties are involved) and/or the South Dakota Wildland Fire Dispatch office at 605-393-8017 (if South Dakota counties are included) as soon as possible. The Grassland Fire Danger statement will remain in effect until its expiration time unless the product is cancelled.

GRASSLAND FIRE DANGER STATEMENT  
NATIONAL WEATHER SERVICE SIOUX FALLS SD  
530 AM CDT TUE SEP 2 2003

.DISCUSSION...VERY WARM TEMPERATURES AHEAD OF AN APPROACHING COLD FRONT...COUPLED WITH STRONG WINDS...WILL PRODUCE RED FLAG WARNING CONDITIONS IN THE LOWER BRULE AND ADJACENT AREAS TO THE SOUTH AND EAST BETWEEN NOON AND SUNSET. FURTHER EAST, THE CONDITIONS WILL GRADUALLY IMPROVE WITH LESS WIND AND COOLER AFTERNOON TEMPERATURES. HOWEVER THE GRASSLAND FIRE DANGER INDEX WILL STILL BE VERY HIGH OR EXTREME THROUGH MOST OF SOUTHEAST SOUTH DAKOTA. CONDITIONS WILL IMPROVE BY SUNSET WHEN TEMPERATURES COOL AND THE WINDS DRAMATICALLY SUBSIDE.

DEBRIS BURNING IS THE NUMBER ONE CAUSE OF WILDFIRES...SO PLEASE BE CAREFUL WITH ANY USE OF FIRE.

SDZ050-052-057-058-063-064-030000-  
AURORA-BRULE-CHARLES MIX-DOUGLAS-GREGORY-JERAULD-  
INLCUDING THE CITIES OF...CHAMBERLAIN...LAKE ANDES...GREGORY...  
530 AM CDT TUE SEP 2 2003

...RED FLAG WARNING FROM NOON THROUGH SUNSET...

AHEAD OF AN APPROACHING COLD FRONT...AFTERNOON TEMPERATURES WILL AVERAGE A VERY WARM 90 TO 95 DEGREES...WITH SOUTH WINDS OF 25 TO 35 MPH. DUE TO THE RECENT DRY SPELL...AFTERNOON RELATIVE HUMIDITY VALUES WILL FALL TO NEAR 15 TO 20 PERCENT WITH VERY DRY FUELS. AT SUNSET...TEMPERATURES WILL FALL TO ABOUT 75...WITH SOUTH WINDS RAPIDLY DECREASING TO 15 TO 20 MPH. RELATIVE HUMIDITY VALUES WILL ALSO INCREASE TO 35 TO 40 PERCENT. EXPECT A WIND SHIFT FROM THE SOUTH TO THE NORTHWEST NEAR 8 PM CDT.

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SDZ038-053-059-060-065-068-069-030000-  
BEADLE-BON HOMME-DAVISON-HANSON-HUTCHINSON-SANBORN-YANKTON-  
INCLUDING THE CITIES OF...HURON...MITCHELL...TYNDALL...YANKTON...  
530 AM CDT TUE SEP 2 2003

THE GRASSLAND FIRE DANGER INDEX WILL REACH THE EXTREME CATEGORY THIS AFTERNOON. AFTERNOON TEMPERATURES WILL AVERAGE 85 TO 90 DEGREES...WITH SOUTH WINDS OF 20 TO 25 MPH. RELATIVE HUMIDITY VALUES WILL FALL TO ABOUT 25 PERCENT. AT SUNSET...CONDITIONS WILL IMPROVE WITH TEMPERATURES FALLING TO 70 TO 75 AND THE SOUTH WINDS DECREASING TO ABOUT 15 MPH. RELATIVE HUMIDITY VALUES WILL ALSO INCREASE TO NEAR 40 PERCENT. EXPECT A WIND SHIFT FROM THE SOUTH TO NORTHWEST NEAR 9 PM CDT.

\$\$

SDZ039-054-055-061-066-070-030000-  
CLAY-KINGSBURY-LAKE-MCCOOK-MINER-TURNER-  
INCLUDING THE CITIES OF...DE SMET...MADISON...SALEM...PARKER...VERMILLION...  
530 AM CDT TUE SEP 2 2003

THE GRASSLAND FIRE DANGER INDEX WILL REACH THE VERY HIGH CATEGORY THIS AFTERNOON. AFTERNOON TEMPERATURES WILL AVERAGE IN THE MID 80S...WITH SOUTH WINDS OF 20 TO 25 MPH. RELATIVE HUMIDITY VALUES WILL FALL TO ABOUT 30 PERCENT. THE ONE HOUR FUELS IN THIS AREA ARE SLIGHTLY MORE GREEN THAN ADJACENT AREAS JUST TO THE WEST. AT SUNSET...CONDITIONS WILL IMPROVE WITH TEMPERATURES FALLING TO 70 TO 75 AND THE SOUTH WINDS DECREASING TO ABOUT 15 MPH. RELATIVE HUMIDITY VALUES WILL ALSO INCREASE TO NEAR 40 PERCENT. EXPECT A WIND SHIFT FROM THE SOUTH TO NORTHWEST NEAR 10 PM CDT.

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(continued on next page)

SDZ040-056-062-067-071-IAZ001-012-020-031-NEZ013-014-MNZ071-097-098-030000-  
 BROOKINGS-LINCOLN-MINNEHAHA-MOODY-UNION-LYON IA-PLYMOUTH IA-SIOUX IA-WOODBURY IA-DAKOTA NE-  
 DIXON NE-LINCOLN MN-PIPESTONE MN-ROCK MN-  
 INCLUDING THE CITIES OF...BROOKINGS...SIOUX FALLS...CANTON...ELK POINT...SIOUX CITY IA...LE  
 MARS IA...ORANGE CITY IA...SOUTH SIOUX CITY NE...PIPESTONE...LIVERNE...  
 530 AM CDT TUE SEP 2 2003

THE GRASSLAND FIRE DANGER INDEX WILL REACH THE HIGH CATEGORY THIS AFTERNOON.

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IAZ002-003-013-014-021-022-032-MNZ072-080-081-089-090-030000  
 BUENA VISTA IA-CHEROKEE IA-CLAY IA-DICKINSON IA-IDA IA-OBRIEN IA-OSCEOLA IA-COTTONWOOD MN-  
 JACKSON MN-LYONS MN-MURRAY MN-NOBLES MN-  
 INCLUDING THE CITIES OF...STORM LAKE IA...SPENCER IA...SPIRIT LAKE IA...WORTHINGTON  
 MN...MARSHALL MN...  
 WINDOM MN...JACKSON MN...  
 530 AM CDT TUE SEP 2 2003

THE GRASSLAND FIRE DANGER INDEX WILL REACH THE MODERATE CATEGORY THIS AFTERNOON.

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NAME (optional)

Figure 8. Example of a Rangeland Fire Danger Statement

## 6. NATIONAL FIRE DANGER RATING SYSTEM (NFDRS)

- a) **Criteria** – Seasonal NFDRS point forecasts will likely be generated in the future. This is a new program from NWS Sioux Falls and is in a state of flux. After a period of trial and error, it will need to be determined which RAWS sites a NFDRS point forecast will be generated for and for which part(s) of the season (e.g., spring only, spring and fall only, the entire “warm season”). NWS Sioux Falls will only generate a NFDRS point forecast for RAWS sites which reside within the Sioux Falls forecast area. Table 1 lists RAWS sites in or near the NWS Sioux Falls forecast area.

The NFDRS is designed to represent the fire potential at the “worst of time of day” over a large area, generally in excess of 100,000 acres. The output from the NFDRS serves to indicate the level of fire danger for the next day. From this, resource allocation and staffing are determined by the land management agencies.

- b) **Content and Format** – A current 1300 LST observation must be received from the RAWS unit for a NFDRS forecast to be generated. It is noted that when using RAWS observations for NFDRS calculations, WIMS truncates the minutes from the observation. For example a RAWS observation taken at 1259 is called a 1200 observation and one taken at 1301 is called a 1300 observation. Remembering that 1300 LST is 2 pm CDT, if the observation is taken at 2:40 pm CDT for example, then that observation is deemed the 1300 LST observation (2 pm CDT). These observations are the basis for generating forecasts valid 24 hours later, so NFDRS forecast issuance times are dependent on the arrival of these observations. If an observation is not received, then a NFDRS forecast will not be generated. Observations generally arrive in the mid afternoon hours and forecasts follow soon thereafter. NFDRS forecasts are valid 24 hours from the time of the observation (1300 LST).

The format of a NFDRS point forecast is as follows:  
**FCST,NO,YYMMDD,13,WX,TEMP,RH,LAL1,LAL2,WDIR,WSPD,10HR,Tx,Tn,RHx,RHn,PD1,PD2,WETFLAG**

The elements in the NFDRS forecast (with an example shown in Figure 9) are:

- **FCST:** denotes that the NFDRS forecast will be for an individual station.
- **NO:** is the individual 6-digit NFDRS site number.
- **YYMMDD:** Year, month and day for which the forecast is valid (tomorrow's date).
- **13:** Always 1300 LST.
- **WX:** Weather valid at 1300 LST tomorrow. Valid entries are:
  - 0 clear
  - 1 scattered clouds (1/8 to 4/8 coverage)
  - 2 broken clouds (5/8 to 7/8 coverage)
  - 3 overcast clouds (more than 7/8 coverage)
  - 4 foggy
  - 5 drizzle
  - 6 raining
  - 7 snowing or sleeting
  - 8 showers (in sight or at the station)
  - 9 thunderstorm
 (categories 5, 6 or 7 sets the NFDRS index to zero)
- **TEMP:** Temperature in deg F valid at 1300 LST tomorrow.
- **RH:** Relative Humidity in percent valid at 1300 LST tomorrow.
- **LAL1:** Lightning Activity Level from 1300 LST today to 2300 LST tonight (always set to 1 in the Sioux Falls forecast area).
- **LAL2:** Lightning Activity Level from 2300 LST tonight to 2300 LST tomorrow night (always set to 1 in the Sioux Falls forecast area).
- **WDIR:** 20 foot wind direction using sixteen points of compass (e.g., N, NNE, NE, ENE, etc.) valid at 1300 LST tomorrow.
- **WSPD:** 20 foot wind speed in mph valid at 1300 LST tomorrow.
- **10HR:** 10 hr fuel moisture (input by the users and left blank, using a "double comma" by the forecaster).
- **Tx:** Max temperature from 1300 LST today to 1300 LST tomorrow.
- **Tn:** Min temperature from 1300 LST today to 1300 LST tomorrow.
- **RHx:** Max relative humidity from 1300 LST today to 1300 LST tomorrow.
- **RHn:** Min relative humidity from 1300 LST today to 1300 LST tomorrow.
- **PD1:** Precipitation duration in hours from 1300 LST today to 0500 LST tomorrow morning.
- **PD2:** Precipitation duration in hours from 0500 LST tomorrow morning to 1300 LST tomorrow afternoon.
- **WETFLAG:** Y or N. Indicates whether liquid water will be on the fuels at 1300 LST tomorrow. (This index will be used with caution. A "Y" value sets all NFDRS indices to zero, therefore an "N" will be used in a vast majority of cases.

FSDFWMFSD TTAA00 KFSD 101948  FCST,395901,040511,13,1,72,38,1,1,SSE,09,,76,52,96,33,2,0,N
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Figure 9. Example of a NFDRS point forecast for the Lake Andes RAWs site.

- c) **Procedures and Access** – NFDRS forecasts are transmitted through the NWS AWIPS computer system. They are then available to customers via WIMS.

Table 1 below shows information for RAWs sites in and close to the Sioux Falls forecast area. All sites listed have GOES links for data transmission. Station inspection and instrument maintenance are the responsibility of land management agencies. NWS forecasters may monitor data quality from these observation sites. If the data appears to be out of calibration compared with surrounding AWOS/ASOS sites, then the NWS forecaster may call the responsible land management agency and relay that information. The six-digit NFDRS ID is assigned by the NWS and used by WIMS. The NESDIS ID is needed for the GOES transmission process.

Station Name	NFDRS ID	NESDIS ID	Lat/Lon	Elevation	County/State	Responsibility
Lake Andes	395901	83788290	43.26/98.76	1,709 ft	Charles Mix/SD	Huron USFWS
Huron	393101	83787214	44.24/98.77	1,877 ft	Hand/SD	Huron USFWS
Redstone	216901	FA645570	44.03/96.32	1,685 ft	Pipestone/MN	Pipestone NPS
Broken Kettle	132201	TBA	42.70/96.58	1,196 ft	Plymouth/IA	IA Nature Cons
Loess Hills	135502	TBA	41.83/95.93	1,070 ft	Harrison/IA	IA DNR

Table 1. Table of information regarding RAWs sites in and close to the FSD forecast area. The “Huron” and “Loess Hills” sites are just outside of the FSD forecast area.

## 7. GRID FORECASTS VIA THE INTERNET

Land management personnel are also welcome to use grid forecasts produced by NWS Sioux Falls to assist in any fire management decisions. Although these grid forecasts can be an invaluable tool, they are not a substitute for a spot forecast, or any other official fire weather product coming from the NWS. Land management personnel should use the grids as just one more tool in your fire weather forecast arsenal.

There are three major forecast tools available from the gridded data base and all are linked to from the NWS Sioux Falls fire weather website. The first selection involves a one-hourly interactive display of gridded forecast data. Upon entering this link <http://www.crh.noaa.gov/ifps/gridpoint.php?site=fsd>, a forecast map will display and the user can pick a point where they wish to see a forecast by clicking a spot on the map. But first, the user should notice a drop-down menu at the top of this page which allows one to pick between three different “styles” of forecast. The first drop-down menu item is a simple seven-day text forecast display for the point that you choose on the interactive map. The second choice is a display of an hourly-weather forecast graph which is a meteogram for a variety of forecasted weather elements that you can pick and choose from (the weather elements which you can display are temperature, dew point, relative humidity, winds, wind chill, sky cover, and potential of rain, snow, freezing rain and thunder). The third option is an hourly display of these weather elements in a tabular format.

The second selection of gridded forecast data from the Sioux Falls fire weather webpage is a “weather activity planner.” Accessed from this URL <http://www.crh.noaa.gov/ifps/wxplanner.php?site=fsd>, the planner allows the user to enter a range of values for selected weather elements (temperature, relative humidity, winds, sky cover and precipitation chances). After entering the range of values for your selected weather elements, click on the interactive map and a bar graph will display showing the timeframes in which your range of values are met for each weather element chosen.

The third selection of gridded forecast data from the main fire weather webpage is a simple, graphical forecast display found at <http://www.crh.noaa.gov/ifps/ifps.php?site=fsd>. Upon entering this selection, the user will see their interactive map display and two pull-down menus at the top of the page. Simply choose which weather element you wish to look at from the left pull-down menu and the timeframe you are interested in from the right pull-down menu, then click your forecast spot of interest on the map. Animation and step controls are also found on this page for your convenience.

## **8. FORECAST SERVICES PROVIDED BY THE STORM PREDICTION CENTER**

The NWS Storm Prediction Center (SPC) from Norman, OK issues a day 1 and day 2 fire weather outlook for the contiguous United States everyday. The URL for these outlooks is <http://www.spc.noaa.gov/products/fire wx/> and is linked to from the main fire weather page on the NWS Sioux Falls website. These outlooks show a graphical map of critical fire weather areas accompanied by a text synopsis. Be aware that these critical fire weather areas are very large scale in nature and there very well could be some discrepancies between the SPC large-scale product and the more localized products coming from NWS weather forecast offices (WFOs).

**B. SPECIAL SERVICES** – Special meteorological services from NWS Sioux Falls include participation in user agency training activities, weather observer training and weather observation station visits requested by user agencies, as time and office staffing permits. These services are usually provided away from the office and possibly on overtime. As stated in the Interagency Agreement for Meteorological Services, the user agencies will pay overtime, travel and per diem costs for these special services.

**C. TRAINING** – The NWS recognizes the need for specialized training in fire weather meteorology for forecasters. All NWS meteorologists producing fire weather products will have met the requirements set forth in NWSI 10-405. These include the completion of S-290, either by residence course or CD-ROM, for all forecasters who generate fire weather products. In addition for the fire weather program leader, completion of the S-591 Fire Weather Forecasters course is required. It is also recommended that the fire weather program leader complete S-390 (Introduction to Wildland Fire Behavior Calculations). If the WFO has an NFDRS program, the fire weather program leader must also gain advanced knowledge of the NFDRS through self-study of S-491 (Intermediate NFDRS) course materials. The Sioux Falls fire weather program leader has completed S-591 and S-390 through residence courses and S-491 pre-course work.

The fire weather program leader also provides periodic training to the local NWS staff concerning fire weather related issues. The local training focuses on the effects of local terrain and various fuel beds on fire behavior and fire weather parameters, local fire weather forecasting techniques, local fire season climatology, RAWs observations and preparation and dissemination of fire weather products.

**D. BACKUP PRODECURES** – If communications or other equipment problems prevent NWS Sioux Falls from adequately serving the user agencies, a backup service plan is initiated. Sioux Falls' primary backup office is NWS Aberdeen, SD. The most common occurrence of when backup is needed is when a major software upgrade to the AWIPS computer system needs to be completed in the NWS offices. Some software upgrades will take an entire shift to be completed. Otherwise, backup is usually short-lived and rare. As stated in the spot burn section above, a few instances have occurred in which the NWS web servers are temporarily down, but NWS operations as a whole are up and running. This will inhibit a spot burn request from being received into the NWS AWIPS computers. If the user has not received a spot burn forecast via the internet through NWS Spot after about 50 to 60 minutes, call NWS Sioux Falls at 605-330-4247 to see if there is a problem. At that point, if it is determined that the web servers are indeed down, the spot burn request can be disseminated via phone or fax.